

Application No. 10/032,067
Reply to Office Action of February 3, 2003

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

--1. (Currently amended) A power transmission system ~~which has a power synthesizing mechanism connected in a power transmitting manner to an electric motor and a power generator, and a speed change mechanism for changing the rotating speed of said electric motor to transmit a torque of the electric motor to said power synthesizing mechanism, comprising:~~

an engine;

an electric motor; ⁹

⁷
a power synthesizing mechanism for synthesizing powers outputted from the engine and

the electric motor;

⁶
a power generator having an output portion connected to an input portion of the synthesizing mechanism;

⁸
a speed change mechanism for changing the rotating speed of said electric motor to transmit a torque of the electric motor to said power synthesizing mechanism; and

an arranging region for said electric motor and an arranging region for said power generator in the axial directions of the output shaft of said electric motor and the rotary shaft of said power generator,

wherein said arranging regions do not overlap on each other.

Claim 2 (original): A power transmission system according to Claim 1,

wherein the output shaft of said electric motor is arranged in the transverse direction of

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a vehicle.

Claim 3 (original): A power transmission system according to Claim 1,
wherein said power synthesizing mechanism includes a planetary gear mechanism having: a
sun gear; a ring gear arranged on the outer side of said sun gear; and a carrier for holding a
pinion gear meshing with said sun gear and said ring gear.

Claim 4 (original): A power transmission system according to Claim 1,
wherein said speed change mechanism includes a planetary gear mechanism having: a
sun gear; a ring gear arranged on the outer side of said sun gear; and a carrier for holding a
pinion gear meshing with said sun gear and said ring gear.

Claim 5 (original): A power transmission system according to Claim 4,
wherein said speed change mechanism has any of said sun gear, said ring gear and said
carrier fixed so that the torque of said electric motor is increased by said speed change
mechanism and transmitted to said power synthesizing mechanism.

Claim 6 (original): A power transmission system according to Claim 1,
wherein said power synthesizing mechanism includes a first planetary gear mechanism
having: a first sun gear; a first ring gear arranged on the outer side of said first sun gear; and a
first carrier for holding a first pinion gear meshing with said first sun gear and said first ring
gear, and

wherein said speed change mechanism includes: a second planetary gear mechanism having: a second sun gear; a second ring gear arranged on the outer side of said second sun gear; and a second carrier for holding a second pinion gear meshing with said second sun gear and said second ring gear; and

a fixing mechanism for increasing the torque of said electric motor by fixing any of said second sun gear, said second ring gear and said second carrier, to transmit the increased torque to said power synthesizing mechanism.

Claim 7 (original): A power transmission system according to Claim 6,

wherein the first carrier of said first planetary gear mechanism and an engine are connected to each other, wherein said electric motor and the second sun gear of the second planetary gear mechanism are connected to each other, wherein the second carrier of said second planetary gear mechanism is fixed, and wherein the first ring gear of said first planetary gear mechanism and the second ring gear of said second planetary gear mechanism are connected to each other. *Fig 10*

Claim 8 (original): A power transmission system according to Claim 6, further comprising:

a first holding member for holding the first ring gear of said first planetary gear mechanism and the second ring gear of said second planetary gear mechanism rotatably, and arranged on the outer side of said first ring gear and said second ring gear. *Fig 10*

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Claim 9 (original): A power transmission system according to claim 8, further comprising:

an arranging region for said first holding member and an arranging region for said electric motor,

wherein at least a portion of the arranging region for said first holding member and at least a portion of the arranging region for said electric motor overlap on each other in the axial direction of the output shaft of said electric motor.

Claim 10 (original): A power transmission system according to claim 7, further comprising:

a rotary member for connecting said engine and said first carrier and is arranged on the same axis as the output shaft of said electric motor.

Claim 11 (currently amended): A power transmission system according to Claim 1, further comprising:

a rotary member offset in the radial direction with respect to the output shaft of said electric motor and connected to said an engine.

Claim 12 (original): A power transmission system according to Claim 11, further comprising,


a first gear connected to the output shaft of said electric motor, and

wherein said speed change mechanism includes an internal gear, and

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wherein said first gear is arranged in the inside space of said internal gear and meshes with said internal gear.

Claim 13 (currently amended): A power transmission system according to claim 12, further comprising:

 a second holding member for holding said internal gear rotatably and is arranged on the outer side of said internal gear.

Claim 14 (original): A power transmission system according to claim 13, further comprising:

an arranging region for said second holding member,

wherein at least a portion of the arranging region for said second holding member and at least a portion of the arranging region for said electric motor overlap on each other in the axial direction of the output shaft of said electric motor.

Claim 15 (currently amended): A power transmission system according to Claim 11, further comprising:

a second gear made rotatable together with said first ring gear,

wherein the output shaft of said engine is connected to said first ~~sun~~ gear carrier, and

wherein said speed change mechanism includes said second gear, and a third gear for transmitting the power of said electric motor to said second gear.

Claim 16 (currently amended): A power transmission system according to Claim ~~11~~ 7, further comprising:

a fourth gear made rotatable together with said first ring gear; and

a fifth gear made rotatable together with said fourth gear,

wherein the output shaft of said engine is connected to said first ~~sun~~

gear carrier,

wherein said speed change mechanism includes said fourth gear, and

a sixth gear for transmitting the power of said electric motor to said fourth gear, and

wherein the power of said first ring gear and the power of said fourth gear are synthesized so that the synthesized power is transmitted through said fifth gear to wheels.

Claim 17 (currently amended): A power transmission system according to Claim ~~11~~ 7, further comprising:

a seventh gear made rotatable together with said first ring gear; and

an eighth gear mesh with said seventh gear,

wherein said speed change mechanism includes said eighth gear, and

a ninth gear for transmitting the power of said electric motor to said eighth gear, and

wherein the power of said seventh gear and the power of said ninth gear are synthesized so that the synthesized power is transmitted through said eighth gear to wheels.

Claim 18 (original): A power transmission system according to claim 1,

wherein a space for separating the arranging region for said electric motor and the arranging region for said power generator is formed between said electric motor and said power generator in the axial direction, and arranges said power synthesizing mechanism and said speed change mechanism therein.

Claim 19 (original): A power transmission system according to claim 1, further comprising:

a wound transmission member made to run on the output member of said power synthesizing mechanism and an intermediate rotary member;

a differential arranged concentrically with said intermediate rotary member; and

a decelerating planetary gear mechanism arranged concentrically with said intermediate rotary member and said differential and, when transmitting the power of the intermediate rotary member to the differential, transmitting the power by decelerating the rotating speed of the power.

Claim 20 (original): A power transmission system according to claim 18, further comprising:

a wound transmission member made to run on the output member of said power synthesizing mechanism and an intermediate rotary member;

a differential arranged concentrically with said intermediate rotary member; and

a decelerating planetary gear mechanism arranged concentrically with said intermediate rotary member and said differential and, when transmitting the power of the intermediate rotary member to the differential, transmitting the power by decelerating the rotating speed of the power.

Claim 21 (New): A power transmission system which has a power synthesizing mechanism connected in a power transmitting manner to an electric motor and a power generator, and a speed change mechanism for changing the rotating speed of said electric motor to transmit a torque of the electric motor to said power synthesizing mechanism, comprising:

an arranging region for said electric motor and an arranging region for said power generator in the axial directions of the output shaft of said electric motor and the rotary shaft of said power generator,

wherein said arranging regions do not overlap on each other,

wherein said power synthesizing mechanism includes a first planetary gear mechanism having: a first sun gear; a first ring gear arranged on the outer side of said first sun gear; and a first carrier for holding a first pinion gear meshing with said first sun gear and said first ring gear and connected to an engine, and

wherein said speed change mechanism includes: a second planetary gear mechanism having: a second sun gear connected to the electric motor; a second ring gear arranged on the outer side of said second sun gear and connected to the first ring gear; and a second carrier for holding a second pinion gear meshing with said second sun gear and said second ring gear: and a fixing mechanism for increasing the torque of said electric motor by fixing any of said second sun gear, said second ring gear and said second carrier, to transmit the increased torque to said power synthesizing mechanism.

Claim 22 (New): A power transmission system which has a power synthesizing mechanism connected in a power transmitting manner to an electric motor and a power generator, and a speed change mechanism for changing the rotating speed of said electric motor to transmit a torque of the electric motor to said power synthesizing mechanism, comprising:

an arranging region for said electric motor and an arranging region for said power generator in the axial directions of the output shaft of said electric motor and the rotary shaft of

said power generator,

wherein said arranging regions do not overlap on each other,

wherein said power synthesizing mechanism includes a first planetary gear mechanism having: a first sun gear; a first ring gear arranged on the outer side of said first sun gear; and a first carrier for holding a first pinion gear meshing with said first sun gear and said first ring gear,

wherein said speed change mechanism includes: a second planetary gear mechanism having: a second sun gear; a second ring gear arranged on the outer side of said second sun gear; and a second carrier for holding a second pinion gear meshing with said second sun gear and said second ring gear; and a fixing mechanism for increasing the torque of said electric motor by fixing any of said second sun gear, said second ring gear and said second carrier, to transmit the increased torque to said power synthesizing mechanism, and wherein the first ring gear of said first planetary gear mechanism and the second ring gear of said second planetary gear mechanism are rotatably held by a first holding member which is arranged on the outer side of said first ring gear and said second ring gear.

Claim 23 (New): A power transmission system according to Claim 22, further comprising:

an arranging region for said first holding member and an arranging region for said electric motor,

wherein at least a portion of the arranging region for said first holding member and at least a portion of the arranging region for said electric motor overlap on each other in the axial

direction of the output shaft of said electric motor.

Claim 24 (New): A power transmission system according to Claim 21, further comprising:

a rotary member for connecting said engine and said first carrier and is arranged on the same axis as the output shaft of said electric motor.

Claim 25 (New): A power transmission system according to Claim 21, further comprising:

a rotary member offset in the radial direction with respect to the output shaft of said electric motor and connected to said engine.

Claim 26 (New): A power transmission system according to Claim 21, further comprising,

a first gear connected to the output shaft of said electric motor, and
wherein said speed change mechanism includes an internal gear, and
wherein said first gear is arranged in the inside space of said internal gear and meshes with said internal gear.

Claim 27 (New): A power transmission system according to Claim 26, further comprising:

a second holding member for holding said internal gear rotatably and is arranged on the

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outer side of said internal gear.

Claim 28 (New): A power transmission system according to Claim 27, further comprising:

an arranging region for said second holding member,

wherein at least a portion of the arranging region for said second holding member and at least a portion of the arranging region for said electric motor overlap on each other in the axial direction of the output shaft of said electric motor.

Claim 29 (New): A power transmission system according to Claim 21, further comprising:

a second gear made rotatable together with said first ring gear,

wherein the output shaft of said engine is connected to said first sun gear, and

wherein said speed change mechanism includes said second gear, and a third gear for transmitting the power of said electric motor to said second gear.

Claim 30 (New): A power transmission system according to Claim 21, further comprising:

a fourth gear made rotatable together with said first ring gear; and

a fifth gear made rotatable together with said fourth gear,

wherein the output shaft of said engine is connected to said first sun gear,

wherein said speed change mechanism includes said fourth gear, and a sixth gear for transmitting the power of said electric motor to said fourth gear, and

wherein the power of said first ring gear and the power of said fourth gear are synthesized so that the synthesized power is transmitted through said fifth gear to wheels.

Claim 31 (New): A power transmission system according to Claim 21, further comprising:

A2 a seventh gear made rotatable together with said first ring gear; and

an eighth gear mesh with said seventh gear,

wherein said speed change mechanism includes said eighth gear, and a ninth gear for transmitting the power of said electric motor to said eighth gear, and

wherein the power of said seventh gear and the power of said ninth gear are synthesized so that the synthesized power is transmitted through said eighth gear to wheels.

Claim 32 (New): A power transmission system which has a power synthesizing mechanism connected in a power transmitting manner to an electric motor and a power generator, and a speed change mechanism for changing the rotating speed of said electric motor to transmit a torque of the electric motor to said power synthesizing mechanism, comprising:

an arranging region for said electric motor and an arranging region for said power generator in the axial directions of the output shaft of said electric motor and the rotary shaft of said power generator,

a wound transmission member made to run on the output member of said power

synthesizing mechanism and an intermediate rotary member;

a differential arranged concentrically with said intermediate rotary member; and
a decelerating planetary gear mechanism arranged concentrically with said intermediate rotary member and said differential and, when transmitting the power of the intermediate rotary member to the differential, transmitting the power by decelerating the rotating speed of the power,

wherein said arranging regions do not overlap on each other.

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Claim 33 (New): A power transmission system which has a power synthesizing mechanism connected in a power transmitting manner to an electric motor and a power generator, and a speed change mechanism for changing the rotating speed of said electric motor to transmit a torque of the electric motor to said power synthesizing mechanism, comprising:

an arranging region for said electric motor and an arranging region for said power generator in the axial directions of the output shaft of said electric motor and the rotary shaft of said power generator,

a wound transmission member made to run on the output member of said power synthesizing mechanism and an intermediate rotary member;

a differential arranged concentrically with said intermediate rotary member; and

a decelerating planetary gear mechanism arranged concentrically with said intermediate rotary member and said differential and, when transmitting the power of the intermediate rotary member to the differential, transmitting the power by decelerating the rotating speed of the

power,

wherein said arranging regions do not overlap on each other, and
wherein a space for separating the arranging region for said electric motor and the
arranging region for said power generator is formed between said electric motor and said power
generator in the axial direction, and arranges said power synthesizing mechanism and said
speed change mechanism therein.

Claim 34 (New): A power transmission system which has a power synthesizing
mechanism for synthesizing powers outputted from an electric motor and an engine, a power
generator connected to the synthesizing mechanism, and a speed change mechanism for
augmenting a torque transmitted from the electric motor to said power synthesizing
mechanism, comprising:

a first planetary gear mechanism comprising the speed change mechanism and having:
a first sun gear; a first ring gear arranged on the outer side of the first sun gear; and a first
carrier for holding first pinion gears interposed between the first sun gear and the first ring
gear.

Claim 35 (New): A power transmission system according to Claim 34, further
comprising: a fixing mechanism for increasing the torque of said electric motor by fixing any
of said first sun gear, said first ring gear and said first carrier, to transmit the increased torque
to said power synthesizing mechanism.

Claim 36 (New): A power transmission system according to Claim 35,
wherein the pinion gears mesh with the first sun gear and the first ring gear,
wherein the first sun gear is connected to the electric motor, the first carrier is held by
the fixing mechanism and the first ring gear is connected to an output member.

Claim 37 (New): A power transmission system according to Claim 34, further
comprising:

a second planetary gear mechanism comprising the synthesizing mechanism and
having: a second sun gear; a second ring gear arranged on the outer side of the second sun gear;
and a second carrier for holding second pinion gears interposed between the second sun gear
and the second ring gear;

wherein one of the first sun gear, the first ring gear and the first carrier is connected to
one of the second sun gear, the second ring gear and the second carrier.

Claim 38 (New): A power transmission system according to Claim 37,
wherein the second pinion gear meshes with the second sun gear and the second ring
gear, and
wherein the second sun gear is connected to the power generator, the second carrier is
connected to an output shaft of the engine and the second ring gear is connected to the first ring
gear.

Claim 39 (New): A power transmission system according to Claim 35,

wherein the first pinion gears mesh with the first sun gear and the first ring gear, and
wherein the first sun gear is connected to the electric motor, the first ring gear is fixed
by the fixing mechanism and the first carrier is connected to an output member. FIG 8

Claim 40 (New): A power transmission system according to Claim 39, further
comprising:

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a second planetary gear mechanism comprising the synthesizing mechanism and
having: a second sun gear; a second ring gear arranged on the outer side of the second sun gear;
and a second carrier for holding second pinion gears interposed between the second sun gear
and the second ring gear:

wherein one of the first sun gear, the first ring gear and the first carrier is connected to
one of the second sun gear, the second ring gear and the second carrier.

Claim 41 (New): A power transmission system according to Claim 39,

wherein the second pinion gears mesh with the second sun gear and the second ring
gear,

wherein the second sun gear is connected to the power generator, the second carrier is
connected to an output shaft of the engine and the second ring gear is connected to the first ring
gear.